

CLAIMS

What is claimed is:

1. A variable rate spring assembly comprising:
 - a housing defining a chamber;
 - a layer of compressible medium disposed with said chamber;
 - a layer of electro-reactive medium disposed with said chamber;
 - a coil assembly associated with said layer of electro-reactive medium;
 - a controller in communication with said coil assembly to control a magnetic field generated by said coil assembly; and
 - at least one attachment member movable relative to said housing.
2. The assembly of claim 1, wherein said attachment member moves relative to said housing proportionate to a compressibility of said layer of compressible medium and said layer of electro-reactive medium.
3. The assembly of claim 1, wherein said layers move within said cavity in response to energy input from said attachment member.
4. The assembly of claim 1, wherein said housing includes a recess, and said layer of electro-reactive medium extends into said recess for limiting movement of said layer of electro-reactive medium relative to said housing.

5. The assembly of claim 4, wherein said layer of electro-reactive medium locks into said recess preventing movement of said layer of electro-reactive medium relative to said housing.
6. The assembly of claim 1, comprising at least two layers of compressible medium disposed on opposite sides of said layer of electro-reactive medium.
7. The assembly of claim 1, wherein each of said layers is separated by sealed plates movable relative to each other.
8. The assembly of claim 7, wherein each of said sealed plates defines a cross-sectional area for distributing a load placed on said assembly.
9. The assembly of claim 7, wherein each of said sealed plates are the same size.
10. The assembly of claim 7, wherein at least one of said sealed plates is of a different size than another of said sealed plates.
11. The assembly of claim 7, wherein said attachment member is attached to one of said sealed plates.

12. The assembly of claim 1, wherein said controller varies electric current supplied to said coil assembly to vary compressibility characteristics of said electro-reactive medium.
13. The assembly of claim 1, comprising three layers of compressible medium and three layers of electro-reactive medium.
14. The assembly of claim 12, wherein said layers of compressible medium and electro-reactive medium are alternated such that no two adjacent layers are identical.
15. The assembly of claim 1, comprising a stiffness variable in response to said magnetic field applied to said layer of electro-reactive medium.
16. The assembly of claim 15, wherein said stiffness of said assembly varies proportionately with a magnitude of said magnetic field.
17. The assembly of claim 1, further including multiple layers of said compressible medium, and at least two of said multiple layers comprise different compressible medium.
18. The assembly of claim 1, further including multiple layers of said electro-reactive medium, and at least two of said multiple layers comprise different electro-reactive medium.

19. A method of absorbing energy comprising the steps of:
 - a. separating adjacent layers of compressible medium and electro-reactive medium within a housing with movable plates;
 - b. attaching a first member to a first structure;
 - c. attaching a second member to a second structure movable relative to said first structure;
 - d. absorbing energy input from either of said first or second members in proportion to an overall compressibility of the adjacent layers of compressible medium and electro-reactive medium.
20. The method of claim 19, comprising the step of creating a magnetic field associated with said electro-reactive medium, and varying said overall compressibility in proportion to a magnitude of said magnetic field.
21. The method of claim 20, comprising varying said magnitude of said magnetic field in response to signals received by a controller indicative of changes in a predetermined condition.
22. The method of claim 19, comprising the step of dispersing input energy over a surface of the compressible medium and the electro-reactive medium through said movable plates.